Algebraic Reasoning Kit: Grade 4 Lesson—Patterns with Square Numbers

**Exploration**

Part 1

*You’re designing square patios. Each patio has a square garden area in the center. You use blue tiles to represent the soil of the garden. Around each garden, you design a border of red tiles. The pictures below show the three smallest square patios that you can design with blue tiles for the garden and red tiles for the border.*

* Ask students to build the three patios using blue and red tiles to show the garden and the border. Record the number of red and blue tiles for each patio in table.
  + *How many tiles will there be in the next-largest patio?*

Part 2

* Continue the table for the next 2 squares.
  + *How do you know your answers are correct?*
  + *Describe your methods for counting the different tiles.*
  + *What patterns do you see? What is your rule for the number of tiles on the patio and the number on the border?*
  + *Test your rule with another example of a patio.*
  + *Can you make a square with 49 blue tiles? Explain why or why not.*
  + *As the patio gets larger, how does the number of red tiles change? How does the number of blue tiles change? How are these numbers represented in the table and in the graph?*